

[JP,2002-227957,A]

Japanese (PDF)

File Wrapper Information

FULL CONTENTS CLAIM + DETAILED DESCRIPTION  
TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS  
DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\* \*\*).
2. Texts in the figures are not translated and shown as it is.

Translated: 04:31:59 JST 11/08/2008

Dictionary: Last updated 10/08/2008 / Priority: 1. Electronic engineering /  
 2. Manufacturing/Quality / 3. Technical term

FULL CONTENTS

**[Claim(s)]**

[Claim 1] The compound screw with which a screw part is characterized by 1 or forming two or more articles between the pitches of a ball screw part.

[Claim 2] The amount of crevices formed in said screw part is a compound screw according to claim 1 characterized by being formed smaller than the amount of crevices formed in said ball screw part.

[Claim 3] It is the compound screw according to claim 1 or 2 characterized by said screw part being a trapezoidal thread.

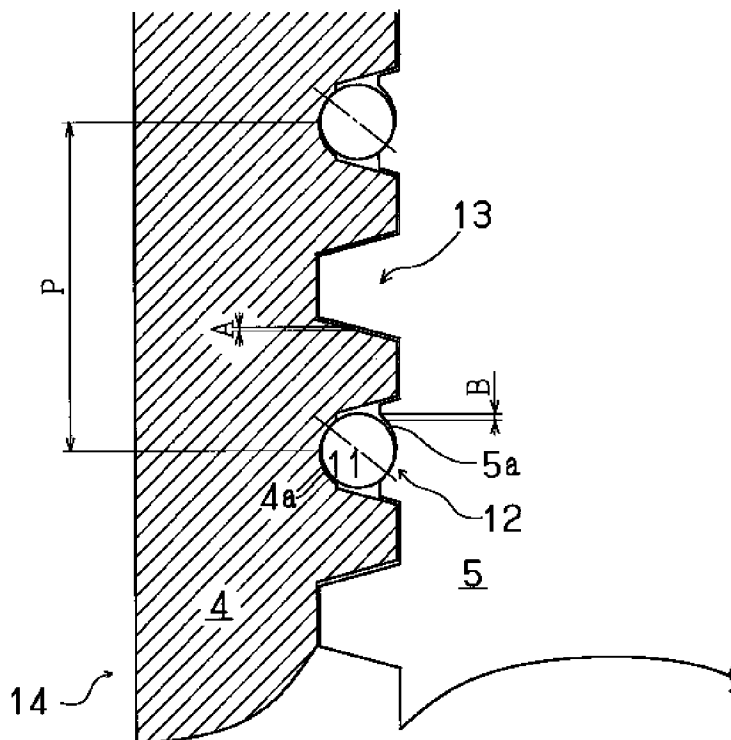
[Claim 4] It is the compound screw according to claim 1 or 2 characterized by said screw part being a square thread.

**[Detailed Description of the Invention]**

[0001]

[Field of the Invention] This invention relates to the ball

Drawing selection **Representative draw**



[Translation done.]

screw used for the drive of the member which requires the high load of a servo press, an injection molding machine, etc.

[0002]

[Description of the Prior Art] The ball screw with sufficient energy transfer efficiency is used for the drive of a metallic mold fixation part (for example, rhm) by the machine which has a servo motor in the source of a drive, for example, a servo press and an injection molding machine. However, high load is applied in these parts. Generally, since a ball screw is inferior to withstand load nature, various devices have been made.

[0003] For example, in the JP,2000-130542,A gazette, the multi-thread ball screw which multi-thread-ized the screw slot on the ball screw, increased the circular number, and increased the number of balls in a nut is indicated.

moreover, [ a JP,2000-291770,A gazette ] By using the ball which is two kinds from which a ball diameter differs, it divides into the ball which receives load, and the ball which plays the role of a spacer, and the ball screw which presses down friction of the ball especially in a low speed region, and aims at increase prevention of this torque is indicated.

[0004]

[Problem to be solved by the invention] It is thought that it is not what it has to the feature which a trapezoidal thread and a square thread have although the above-mentioned conventional invention improves a ball screw, raises withstand load nature and tries high life-ization. In this invention, while corresponding to the high load which is the feature which a trapezoidal thread, a square thread, etc. have, it is in offering the screw mechanism (compound screw) which realized efficient energy transfer which is the feature of a ball screw, and attained reinforcement as a result.

[0005]

[Means for solving problem] Invention of Claim 1 is a compound screw with which a screw part is characterized by 1 or forming two or more articles between the pitches of a ball screw part. Moreover, the amount of crevices in which invention of Claim 2 is formed in said screw part is a compound screw according to claim 1 characterized by being formed smaller than the amount of crevices formed by said ball screw.

[0006] In invention of Claim 1, screw parts, such as the shape of general cross-sectional Yamagata between the pitches of a ball screw part, were prepared. That is, a multiple thread screw consists of a whole screw. Furthermore, in invention of Claim 2, the amount of crevices formed in a screw part was formed smaller than the amount of crevices formed in a ball screw part. This will

receive load in a screw part with a small crevice, when load is applied to a nut, for example in parallel with an axis. That is, since the ball of a ball screw part does not receive load and receives load in the high screw part of withstand load nature, withstand load nature of the whole (compound screw) screw can be made high compared with the conventional ball screw.

[0007] Moreover, invention of Claim 3 is a compound screw according to claim 1 or 2 characterized by said screw part being a trapezoidal thread. Furthermore, invention of Claim 4 is a compound screw according to claim 1 or 2 characterized by said screw part being a square thread.

[0008] Generally a trapezoidal thread and a square thread have high screw efficiency compared with the triangular thread usually used. Then, the compound screw which has still higher screw efficiency can be offered by making form of Claim 1 and the screw part in invention of 2 into a trapezoidal thread or a square thread.

[0009]

[Mode for carrying out the invention] As an example which applied this invention, the servo press 1 is shown in drawing 4. The slide 3 is formed in the frame 2 of the servo press 1 free [ rise and fall ]. Moreover, a servo motor 7 is formed in the upper part of a frame 2, and the small belt pulley 7a is fixed to the driving shaft of a servo motor 7. On the other hand, the nut 4 is formed in the upper part of the slide 3. And the screw axis 5 prepared in a frame 2 free [ rotation ] is screwed with the nut 4. The compound screw according [ this screwing portion ] to this invention is formed. The large belt pulley 6 is fixed to the upper part of the screw axis 5. The large belt pulley 6 and the small belt pulley 7a are connected with the belt 8.

[0010] Drag 10b is fixed to the upper surface of the bolster 9 which Cope 10a is fixed to the undersurface of slide 3, and is fixed to this and the frame 2 which counteracted on the other hand. Thus, a metallic mold 10 is constituted by Cope 10a and Drag 10b, and makes a servo motor 7 the source of a drive, slide 3 operates free [ rise and fall ], and the press processing of the material laid between metallic molds 10 is carried out. At the time of this press processing, high load takes for a nut 4 above [ parallel to the screw axis 5 ].

[0011] Here, the details of the portion (compound screw 14) which the nut 4 and the screw axis 5 are screwing are shown in drawing 1. Slots 4a and 5a are established in the nut 4 and the screw axis 5, respectively. And the ball 11 is formed in Slots 4a and 5a. Thus, the ball screw part 12 is formed. In addition, the circuit which circulates a ball 11 carried out the illustration abbreviation. Moreover, although not illustrated, a ball 11 adjoins along the screw slot formed in Slots 4a and 5a, and are prepared. [ two or more ]

[0012] Furthermore, the trapezoidal thread part 13 is formed between [ P ] the pitches of the ball screw part 12. That is, the compound screw 14 is formed in multi-thread of the ball screw part 12 and the trapezoidal thread part 13. In addition, although this example showed the example by which the trapezoidal thread part 13 of one articles is formed between [ of the ball screw part 12 / P ] pitches, two or more articles of trapezoidal thread parts 13 may be formed between [ of the ball screw part 12 / P ] pitches. Furthermore, although this example showed the example by which the trapezoidal thread part 13 is formed between [ of the ball screw part 12 / P ] pitches, it can replace with a trapezoidal thread by the use, and a triangular thread and a square thread can also be formed.

[0013] Moreover, in this example, it formed smaller than the crevice B formed with Slot 5a (slot 4a) and the ball 11 at the time of the nut 4 and the screw axis 5 screwing the crevice A formed in the screw thread and screw slot of the trapezoidal thread part 13 so that the crevice between the ball screw parts 12 may approach one side ( $A < B$ ). In addition, the ball 11 touches Slots 4A and 5A by one point (they are two points at the ball 11 whole), respectively at this time.

[0014] Next, slide 3 operates and the action of the compound screw 14 in the case of performing press processing is explained based on drawing 2 and drawing 3 . When slide 3 descends from a top dead center, as shown in drawing 2 , down power is applied to a nut 4 with gravity. Therefore, a ball 11 contacts by two points, the crevice between the ball screw parts 12 approaches one side, and the above-mentioned crevice B is formed. On the other hand, the trapezoidal thread part 13 has Crevice A. For this reason, transfer of the energy by the servo motor 7 at this time is performed through the ball screw part 12. Therefore, energy is efficient and is transmitted.

[0015] If Cope 10a contacts material and load occurs as slide 3 descends further and it is shown in drawing 3 , slide 3 and a nut 4 will receive load up. Since the crevice A between trapezoidal thread parts is smaller than the crevice B between the ball screw parts 12 at this time, the crevice A between trapezoidal thread parts disappears beyond the crevice B between the ball screw parts 12. That is, the load at the time of press processing will be received in the trapezoidal thread part 13, and does not require load for the ball screw part 12 (ball 11). And after press processing is completed, it will be in the state of above-mentioned drawing 2 again.

[0016] Here, generally trapezoidal thread form has withstand load nature higher than a ball screw. The compound screw 14 uses the efficient nature of the ball

screw part 12, when only driving slide 3, and the trapezoidal thread part 13 receives the load at the time of fabrication. Therefore, the compound screw of this invention is excellent in withstand load nature compared with the conventional ball screw, and, as a result, a life becomes long. Moreover, what is called compared with screws, such as the conventional trapezoidal thread, energy can be transmitted efficient according to the effect of a ball screw part.

[0017] In addition, although this example showed the case where it applied to a servo press, this invention is applicable to a part for the actuator of a member which receives the high load of other machines, for example, an injection molding machine etc. In this case, gravity parallel to the screw axis 5 is not applied to a nut 4, but when only driving and the above-mentioned crevices A and B are not formed, forming load applies the power of a counter direction to a nut 4 by a counter balancer etc. Then, Crevices A and B are formed, and it drives in the ball screw part 12 except the time of fabrication, and can drive now in response to load by a screw part at the time of fabrication.

[0018]

[Effect of the Invention] By Claim 1 and invention of 2, it has the feature of screws, such as a triangular thread, and a ball screw, and screw efficiency is high, it excels in withstand load nature, and a long-life compound screw can be offered. Moreover, by Claim 3 and invention of 4, since a screw part is made into a trapezoidal thread or a square thread, the compound screw which was further excellent in screw efficiency can be offered.

#### [Brief Description of the Drawings]

[Drawing 1] The detailed sectional view of the screwing portion of the compound screw which is the work example of this invention

[Drawing 2] The detailed sectional view showing the screwing portion in the state where the nut received gravity

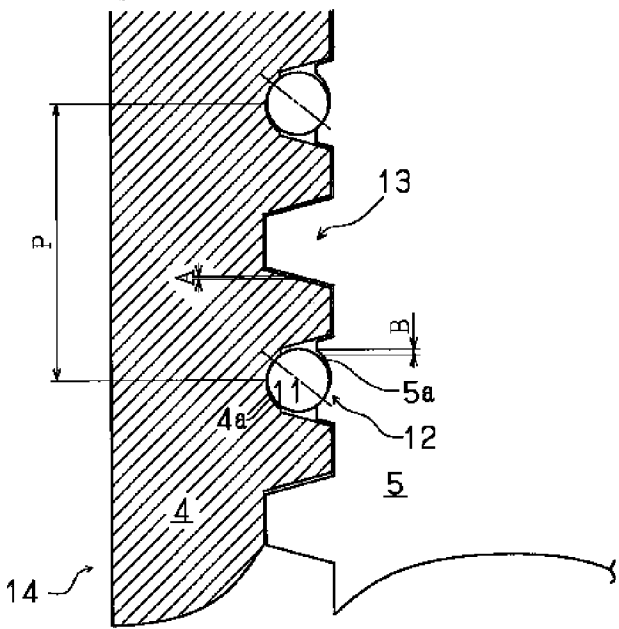
[Drawing 3] The detailed sectional view showing the screwing portion in the state where load was received

[Drawing 4] The whole servo press front view to which this invention was made to apply

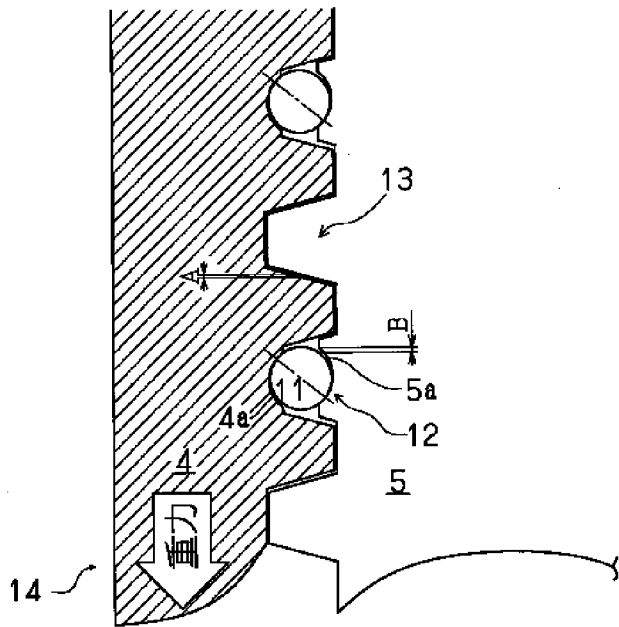
#### [Explanations of letters or numerals]

As for a frame and 3, a nut and 5 for 1 a slide and 4 a servo press and 2 A screw axis, 4a and 5a -- a slot and 7 -- a servo motor and 7a -- a small belt pulley and 8 -- a belt and 9 -- a bolster and 10 -- a metallic mold and 10a -- a cope and 10b -- a drag and 11 -- a ball and 12 -- a ball screw part and 13 -- a trapezoidal thread part and 14 -- a compound screw.

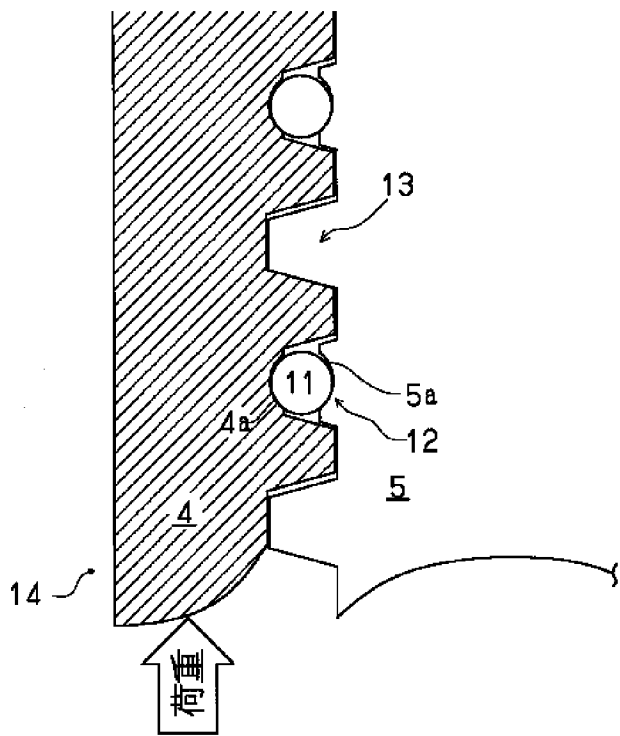
[Drawing 1]



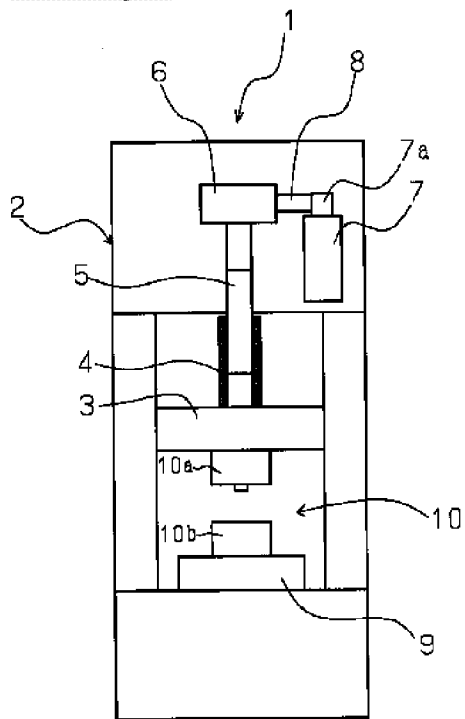
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

Report Mistranslation

Japanese (whole document in PDF)

